

REMARKS

Claims 1-6 are pending herein. By the Office Action, claims 2-4 were allowed, and claims 1, 5 and 6 are rejected under 35 U.S.C. §103(a). By this Amendment, claims 1, 5 and 6 are amended. Support for the amendments to claims 1, 5 and 6 can be found in the specification as filed. No new matter is added.

Applicants thank the Examiner for the indication that claims 2-4 are allowed. For the reasons set forth below, all of claims 1-6 are believed to be in condition for allowance.

The Office Action requires submission of corrected formal drawings for Figs. 7A and 7B, incorporating the approved changes. A Letter to the Official Draftsperson with the corrected formal drawings is attached hereto.

The Office Action rejects claims 1, 5 and 6 under 35 U.S.C. §103(a) over Seto (Japanese Publication No. 6-117221) ("Seto") in view of Maaseidvaag et al. (U.S. Patent 6,167,696). This rejection is respectfully traversed.

The Office Action asserts that Seto discloses all of the features of the claimed invention, particularly independent claims 1 and 5, except for the limitation that the NO_x absorbent can also function as a particulate filter. The Office Action argues, however, that a combined NO_x absorbent and particulate filter is conventional, as shown in Maaseidvaag. Applicants respectfully disagree.

According to the claimed invention, a catalyst apparatus for purifying NO_x is located in the exhaust system upstream of the particulate filter. The catalyst apparatus can thus carry a large amount of catalyst absorbing NO_x to sufficiently absorb NO_x in the exhaust gas. When the air-fuel ratio in the catalyst apparatus is made rich, the absorbed NO_x is released and can be purified by reduction. As a result, according to the claimed invention, the devices can sufficiently purify NO_x in the exhaust gas. Such devices are not disclosed in and would not have been obvious over a combination of Seto and Maaseidvaag.

In particular, a combination of the cited references fails to teach or suggest at least the claimed features that the device includes (1) the claimed particulate filter, which is a wall-flow particulate filter comprising a partition wall having pores, said partition wall carrying a catalyst (claim 1), an oxidation catalyst (claim 5), or an oxygen absorbing agent (claim 6); (2) that such a material is carried on the exhaust gas upstream side surface thereof; and (3) the claimed combined particulate filter/NO_x absorber.

A. The References Do Not Disclose the Claims Particulate Filter

Each of claims 1, 5 and 6 specifically require that the particulate filter be a wall-flow particulate filter comprising a partition wall having pores, and that the partition wall carries a generic catalyst (claim 1), specifically an oxidation catalyst (claim 5) or an oxygen absorbing agent (claim 6) on the exhaust gas upstream side surface thereof. Neither Seto nor Maaseidvaag teach or suggest the claimed particulate filter, or the advantages that it provides.

Seto is asserted to disclose a catalytic apparatus (17). See Seto at Figs. 1 and 9 and the Abstract. However, that broad generic disclosure in Seto does not disclose, and does not teach or suggest, that the catalytic apparatus is or should be a wall-flow particulate filter comprising a partition wall having pores, where the partition wall carries a catalyst (claim 1), an oxidation catalyst (claim 5), or an oxygen absorbing agent (claim 6); on the exhaust gas upstream side surface thereof. The cited disclosures of Seto do not teach or suggest that such a wall-flow particulate filter could or should be used in preference to any other type of catalytic apparatus, or that such a wall-flow particulate filter would provide any advantages.

Maaseidvaag does not overcome the deficiencies of Seto. Maaseidvaag provides only very broad, generic teachings with respect to the catalyst material. For example, at col. 2, lines 32-47, Maaseidvaag describes that "[c]losely coupled to the exhaust manifold is a three-way catalyst 16 such as a conventional precious metal oxidation catalyst. The three-way catalyst 16 functions to oxidize the majority of the HC and CO as well as a portion of the NO_x in the exhaust flow once the temperature of the three-way catalyst 16 reaches its

operational range. ... Downstream from the HC trap 18 is an electrically heated catalyst (EHC) 20 and a NO_x trap 22. Preferably, NO_x trap 22 is an integral NO_x trap and particulate matter filter capable of absorbing exhaust gas NO_x and filtering particulate matter emissions." Maaseidvaag then describes, at col. 6, lines 33-39, that "The NO_x absorbent is preferably a precious metal such as Pt--Rh and an alkali metal such as potassium or lithium or an alkaline earth metal such as barium or strontium dispersed into an alumina support deposited onto the walls 42 of the second channels 46." However, none of these teachings of Maaseidvaag provide any teaching or suggestion that the catalyst apparatus of Maaseidvaag, much less of a combination of Seto and Maaseidvaag, could or should be a wall-flow type particulate filter, as claimed.

Furthermore, the claimed wall-flow type particulate filter of the claimed invention provides significant advantages, which are likewise not taught or suggested by the cited references. For example, the wall-flow type particulate filter can carry a relatively large amount of the catalyst, as compared to conventional catalyst carriers. As a result, the filter of the claimed invention has the increased abilities to absorb and reduce NO_x and oxidize trapped particulates, as compared to such conventional catalyst systems.

Accordingly, any combination of the cited references fails to teach or suggest that the particulate filter of Seto or of Maaseidvaag could or should be substituted by a wall-flow type particulate filter, as claimed. The combination of the cited references is improper, and would not have rendered obvious the claimed invention.

B. The References Do Not Teach or Suggest the Catalyst Location

Each of claims 1, 5 and 6 also specifically require that catalyst material be located on the exhaust gas upstream side surface of the particulate filter. That is, the partition wall carries a generic catalyst (claim 1), specifically an oxidation catalyst (claim 5) or an oxygen absorbing agent (claim 6) on the exhaust gas upstream side surface thereof. Neither Seto nor Maaseidvaag teach or suggest this feature of the claimed invention.

As described above, Seto does not disclose particulars of the catalytic apparatus, and thus does not teach or suggest the specific location of the material on the exhaust gas upstream side surface of the particulate filter. Maaseidvaag does not overcome this deficiency of Seto.

In fact, Maaseidvaag teaches specifically opposite of the claimed invention. According to Maaseidvaag, the partition wall of the particulate filter carries an NO_x absorbent on the exhaust gas downstream side surface thereof. Accordingly, even if the NO_x absorbent releases active oxygen, the released active oxygen is not in contact with the particulates trapped on the exhaust gas upstream surface and in the pores of the partition wall. Thus, the trapped particulates cannot be oxidized and removed.

Nowhere does Maaseidvaag teach or suggest that the location of the NO_x absorbent could or should be moved from the exhaust gas downstream side surface of the partition wall to the exhaust gas upstream side surface thereof. Nor does Maaseidvaag teach or suggest that such a modification would provide any change in results.

Accordingly, any combination of the cited references fails to teach or suggest that the particulate filter of Seto and/or Maaseidvaag could or should be substituted by a wall-flow type particulate filter, where the partition wall carries an active material on the exhaust gas upstream side surface thereof, as claimed. The combination of the cited references is improper, and would not have rendered obvious the claimed invention.

C. The References Do Not Disclose a Combined Particulate Filter/NO_x Absorber

Each of claims 1, 5 and 6 also specifically require that the device includes a particular filter, which carries a specified catalyst. The Office Action admits that Seto does not disclose such a combined particulate filter and NO_x absorber. However, the Office Action argues that Maaseidvaag discloses this feature, as item 22 in Figures 1 and 4. The Office Action argues that it would have been obvious to combine the combined particulate filter and NO_x absorber

of Maaseidvaag into the device of Seto, to provide an effective means to eliminate soot from the exhaust gas of internal combustion engines. Applicants disagree.

Regardless of whether Maaseidvaag discloses that the particulate filter can also be an NO_x absorber, Maaseidvaag describes that the disclosed particulate filter is inferior. In particular, Maaseidvaag discloses that during lean operation, exhaust gas temperatures can become very low, degrading NO_x absorption efficiency. See col. 3, lines 30-33. Maaseidvaag thus expressly identifies problems with the component that would impair the component's ability to function properly as an NO_x absorber in the device of Seto.

It is axiomatic in patent law that two references can not be combined to render obvious the claimed invention where there is no motivation in the references or elsewhere to make the asserted combination. For example, the Federal Circuit held in In re Oetiker that "[t]here must be some reason, suggestion or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination." 977 F.2d 1443, 1447, 24 USPQ2d 1443, 1446 (Fed. Cir. 1992). See also In re Geiger, 815 F.2d 686, 2 USPQ2d 1276 (Fed. Cir. 1987) ("Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination.").

That is, it is not enough that a reference may be capable of being modified so as to arrive at a claimed invention. To the contrary, the prior art must have suggested the desirability of such modification to one of ordinary skill in the art at the time the invention was made. As stated in Interconnect Planning Corp. v. Feil:

When prior art references require selective combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the patent itself. There must be 'something in the prior art as a whole to suggest the desirability, and thus the obviousness of making the combination.' Critical to the analysis is an understanding of the particular results achieved by the new combination.

774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed. Cir. 1985) (citations omitted).

In the present case, the Office Action improperly combines the cited references, without any motivation to do so. Because Maaseidvaag expressly describes that the disclosed particulate filter is inferior, as being subject to degraded NO_x absorption efficiency, one of ordinary skill in the art would not have been motivated to combine this component of Maaseidvaag into the otherwise operational device of Seto. Such a combination would not have been expected to improve the device of Seto, but instead would have been expected to provide worse results, as described by Maaseidvaag, or to have required additional but unspecified engineering changes to the device of Seto in order to provide any expectation of success.

Accordingly, any combination of the cited references fails to teach or suggest that the problematic particulate filter of Maaseidvaag could or should be incorporated into the device of Seto, to practice the claimed invention. The combination of the cited references is improper, and would not have rendered obvious the claimed invention.

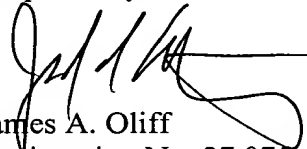
D. Conclusion

Accordingly, claims 1, 5 and 6 define patentable subject matter over Seto in view of Maaseidvaag. Reconsideration and withdrawal of the rejection are respectfully requested.

For at least the reasons set forth above, Applicants respectfully submit that the application is in condition for allowance. Favorable reconsideration and prompt allowance of the claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number set forth below.

Respectfully submitted,


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